United States Environmental Protection Agency | Solid Waste and Emergency Response (5306W) | EPA 530-F-01-006 June 2001 http://www.epa.gov/epr

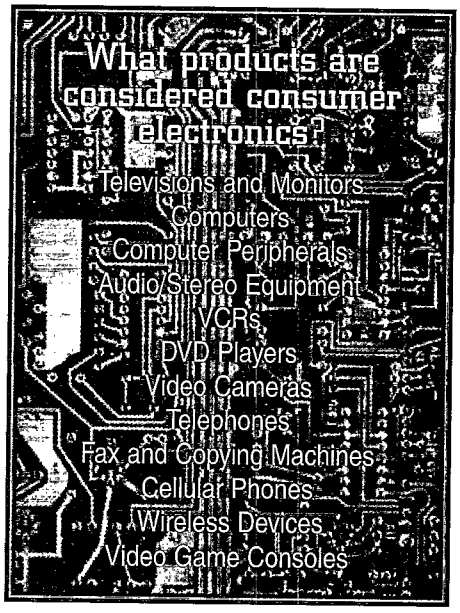
# Electronics: A New Opportunity for Waste Prevention, Reuse, and Recycling

In the past decade, technological advances in electronic data management and communications have spurred economic growth and improved people's lives in countless ways. However, our growing dependence on electronic products both at home and in the workplace has given rise to a new environmental challenge: electronics waste. A recent study by EPA shows that electronics already make up approximately 1 percent of the municipal solid waste stream. Research completed in Europe shows that electronics waste is growing at three times the rate of other municipal waste. To the extent possible, electronics waste should be prevented, and older electronics should be reused and recycled.

## Why Prevent Electronics Waste?

End-of-life electronics:

**Are a fast-growing waste stream.** Over 20 million personal computers became obsolete in 1998. Only 13 percent were reused or recycled. Many municipalities are facing the dilemma of what to do with growing amounts of retired electronics. Rapid changes in computer technology and the emergence of new electronic gadgets exacerbate the problem.



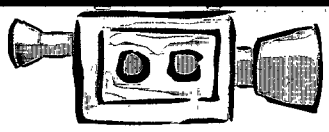

**Can contain hazardous materials.** There are hazardous materials, such as lead, mercury, and hexavalent chromium, in circuit boards, batteries, and color cathode ray tubes (CRTs). Televisions and CRT monitors contain four pounds of lead, on average (the exact amount depends on size and make). Mercury from electronics has been cited as a leading source of mercury in municipal waste. In addition, brominated flame retardants are commonly added to plastics used in electronics. If improperly handled, these toxics can be released into the environment through incinerator ash or landfill leachate.

**Are made with valuable materials.** In 1998, over 112 million pounds of materials were recovered from electronics, including steel, glass, and plastic, as well as precious metals. Reusing and recycling the raw materials from end-of-life electronics conserves natural resources and avoids the air and water pollution, as well as greenhouse gas emissions, that are caused by manufacturing new products.

## How To Reduce Electronics Waste

This fact sheet provides information on ways you can reduce the environmental impact of electronics use and disposal through reuse, donation, recycling, and buying greener electronic products.

## Reusing and Donating Electronics



Preventing waste in the first place is usually preferable to any waste management option...including recycling. Donating electronics for reuse extends the lives of valuable products and keeps them out of the waste management system for a longer time. Reuse, in addition to being an environmentally preferable alternative, also benefits society. By donating your used electronics, you allow schools, non-profit organizations, and lower-income families to use equipment that they otherwise could not afford.

As a household or a business, you may be able to take advantage of tax incentives for computer equipment donations. The 21st Century Classrooms Act for Private Technology Investment encourages large companies to donate computer equipment to public and private schools. When donating equipment to a non-profit organization, inquire about documentation that can be applied toward your income tax return.

Before donating your computer or other electronics, make sure the equipment is reusable. Donation organizations have limited resources and employees to diagnose and repair hardware. A functional, working system, especially with monitor, wiring, and software licenses, is a lot more useful and requires less upgrading than a non-working, incomplete computer. Check to see what the donation organization's minimum computer requirements are. Donation organizations may not accept (or may charge a fee for) older, less useful equipment.

The most appropriate donation organization to handle a computer can vary from area to area. In some cases, the most viable donation organization may be a charity, but in other areas, the appropriate donation organization may be the local school district or materials exchange.

### Where can I donate my computer?

The following are just a few examples of organizations that can provide additional information on donating electronics.

**Goodwill Industries**
*www.goodwill.org*
Many Goodwills accept computer donations. Donations to Goodwill help individuals with disabilities and other disadvantages upgrade their job skills and enter the workforce.

**Students Recycling Used Technology (StRUT)**
*www.strut.org*
The StRUT program teaches students to evaluate and repair donated computer equipment, which is then contributed to local schools. Founded in Oregon, StRUT has since expanded to other states (AZ, CA, MA, NM, OR, TX, and WA). Call (503) 251-3771 to ask about a site near you.

**Learning and Information Networking for Community via Technology (LINCT)**
*www.linct.org*
Using computers donated by businesses, LINCT provides computer training, teaches individuals to refurbish computers, and allows them to earn computers through community service.

**Materials Exchanges**
*www.epa.gov/jtr/comm/exchange.htm*
Many materials exchanges accept electronics. The Southern Waste Information Exchange (SWIX) has developed a materials exchange specifically for electronics at *www.ElectronicXchange.Org*

**Reuse Development Organization (ReDO)**
*www.redo.org*
ReDO is a non-profit organization that promotes reuse of discarded and surplus materials, including electronics. ReDo provides education, training, and technical assistance to help start up and operate reuse programs.

## Recycling Electronics

If donation for reuse or repair is not a viable option, households and businesses can send their used electronics for recycling. Recycling electronics avoids pollution and the need to extract valuable and limited virgin resources. It also reduces the energy used in new product manufacturing.

A growing number of municipalities are offering computer and electronics collections as part of household hazardous waste collections or special events. In addition, public and private organizations have emerged that accept computers and other electronics for recycling. Depending on where you live and the amount of equipment you have, the best recycling option may be a county recycling drop-off center, TV repair shop, charitable organization, electronics recycling company, or even your local electronics retailer, which may collect used products and send them to a recycler.

Some electronics manufacturers are accepting household electronics for recycling. In some cases, these services are provided free-of-charge. Asset management and recovery programs have been available to major corporations and large purchasers of electronic equipment for quite some time. Now, electronics manufacturers are beginning to offer similar services for households and small businesses.

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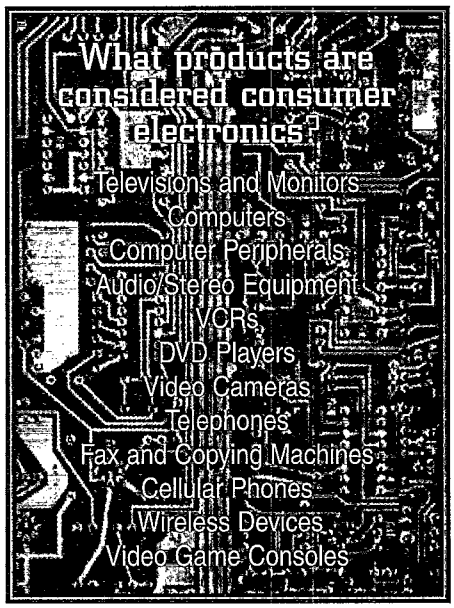


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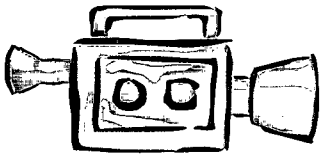

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## Where can I take my computer?

To find an electronics recycling organization near you, visit the following web sites:

**EIA Consumer Education Initiative (CEI)** *www.eiae.org*

The Electronic Industries Alliance (EIA) has developed the Consumer Education Initiative web site to help households and small businesses find environmentally responsible options for donating and recycling electronics in their community.

**International Association of Electronics Recyclers (IAER)** *www.iaer.org/search*

IAER has an online directory of electronics recyclers. This database is ideal for large organizations that are looking for a company to handle used electronics. The IAER web site also has information on electronics recycling news and industry events.

## Buying Green

Environmentally responsible electronics use involves not only proper end-of-life disposition of obsolete equipment, but also purchasing new equipment that has been designed with environmental attributes. Think about this when purchasing new equipment, and ask your retailer or electronics supplier about environmentally preferable electronics. Households, companies, and governmental organizations can encourage electronics manufacturers to design greener electronics by purchasing computers and other electronics with environmentally preferable attributes and by requesting takeback options at the time of purchase.

Look for electronics that:

- Are made with fewer toxic constituents
- Use recycled content
- Are energy efficient (e.g., showing the "Energy Star" label)
- Are designed for easy upgrading or disassembly
- Utilize minimal packaging
- Offer leasing or takeback options
- Have been recognized by independent certification groups (such as the Swedish TCO or Blue Angel) as environmentally preferable.

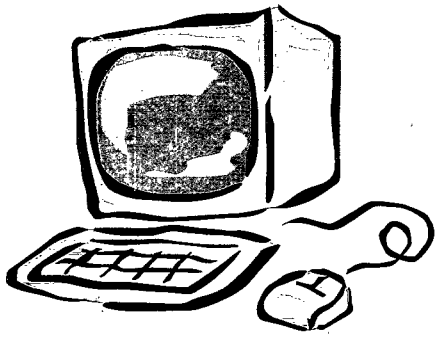
The National Recycling Coalition has assembled information on environmentally preferable procurement of electronics on their web site, at: *www.nrc-recycle.org/Programs/electronics/index.htm*

The Northwest Product Stewardship Council has developed a Guide to Environmentally Preferable Computer Purchasing, available at: *www.govlink.org/nwpsc*

## What EPA Is Doing To Encourage Reuse, Recycling, and Greener Purchasing of Electronics

EPA's goal is to promote greater product stewardship of electronics. Product stewardship means that all who make, distribute, use, and dispose of products share responsibility for reducing the environmental impact of those products. We intend to work towards this goal in three ways: 1) increase reuse and recycling of used electronics, 2) ensure that management of electronics is safe and environmentally sound, and 3) foster a life-cycle approach to product stewardship, including environmentally conscious design, manufacturing, and toxics reduction for new electronic products. EPA is currently working with stakeholders in both the public and private sectors to meet these goals. In support of these efforts, EPA will be looking to streamline regulations and policies. We aim to make it easier and more cost-effective for consumers, retailers, recyclers, manufacturers, and governments at all levels to help divert these products into environmentally sound reuse and recycling, as well as reduce the environmental footprint of electronic product use.

In addition, EPA's Design for the Environment Program *(www.epa.gov/dfe)* is working with electronics manufacturers to incorporate environmental considerations into product design. EPA's Environmentally Preferable Purchasing Program *(www.epa.gov/opptintr/epp)* is helping federal agencies in the purchasing of environmentally preferable products and services, including electronics. Also, the Energy Star Program *(www.energystar.gov)* promotes energy-efficient products through its labeling and education program. EPA's WasteWise Program is challenging its almost 1,100 partners to set goals for reducing electronics waste *(www.epa.gov/wastewise)*. Finally, EPA's Office of Solid Waste is supporting multi-stakeholder dialogues, collection pilots, public education, and international cooperation to foster greater awareness and coordination of electronics reuse and recycling issues. For more information about EPA's efforts to encourage product stewardship for electronics, visit *www.epa.gov/epr*



## Useful Publications

**Analysis of Five Community Consumer/Residential Collections: End-of-Life Electronic and Electrical Equipment** (EPA-901-R-98-003)
U.S. EPA Region 1. April 1999.
*www.epa.gov/region01/programs/csifinal.pdf*
A study that analyzes five residential collection programs and provides comparisons of materials collected and cost considerations.

**Electronic Product Recovery and Recycling (EPR2) Baseline Report: Recycling of Selected Electronic Products in the United States**
National Safety Council. May 1999.
*www.nsc.org/ehc/epr2/baseline.htm*
A report that provides results of the first ever attempt to characterize electronics recovery in the United States.

**Plastics from Residential Electronics Recycling Report 2000**
American Plastics Council. April 2000.
*www.plastics.org/top_level/info.html*
This report analyzes the types of plastics found in consumer electronics and the current technologies available to recycle these plastics.

**End of Life Computer and Electronics Recovery Options for the Mid-Atlantic States, 2nd Edition**
Mid-Atlantic Consortium of Recycling and Economic Development Officials (MACREDO). March 2000.
*www.libertynet.org/macredo/comelc.htm*
A regional policy report and general information document on electronics recovery.

**Electronics Reuse and Recycling Infrastructure Development in Massachusetts** (EPA-901-R-00-002)
U.S. EPA Region 1 and Massachusetts Department of Environmental Protection. September 2000.
*www.epa.gov/region01/compliance/solid/jtrfinal00.pdf*
This report provides a thorough overview of the Massachusetts infrastructure development program that was established prior to the state's landfill ban on CRTs and analyzes various collection options with respect to recovery rates, cost effectiveness, and job creation.

**Recycling Used Electronics: Report on Minnesota's Demonstration Project**
Minnesota Office of Environmental Assistance. April 2001.
*www.moea.state.mn.us/plugin/index.cfm*
This report analyzes the results of the first large-scale, multi-stakeholder effort to remove used electronic products from municipal waste in North America.

**WasteWise Update: Electronics Reuse and Recycling** (EPA-530-N-00-007)
U.S. EPA. October 2000.
*www.epa.gov/wastewise/pdf/wwupda14.pdf*
A publication that provides an overview of electronics recovery issues and options for businesses.

## Organizations

**EPA's Product Stewardship Program**
*www.epa.gov/epr*
EPA's Product Stewardship program encourages more environmentally sustainable management of a variety of products, including electronics. Visit the program's web site for information about electronics stewardship projects that are occurring across the country.

**Electronic Industries Alliance (EIA)**
*www.eia.org*
A trade association for the electronics industry. The EIA web site maintains information on what member companies are doing to incorporate environmental attributes into electronic products.

**International Association of Electronics Recyclers (IAER)**
*www.iaer.org*
A non-profit trade organization that supports the electronics recycling industry. The IAER web site provides information on industry trends and a database of commercial electronics recyclers.

**National Recycling Coalition (NRC)**
*www.nrc-recycle.org/Programs/electronics/index.htm*
A non-profit group dedicated to advancing recycling and source reduction. NRC's Electronics Recycling Initiative web site contains information on procurement and other electronics recycling issues.

**Polymer Alliance Zone (PAZ)**
*www.pazwv.com*
A public-private partnership that is developing a regional center for electronics recycling in West Virginia. Visit the PAZ web site to learn more about this innovative project.

**Silicon Valley Toxics Coalition (SVTC)**
*www.svtc.org*
A grassroots coalition that performs research and advocacy on environmental and human health issues related to electronics. The SVTC web site includes a report on toxics in electronics waste and an analysis of the environmental performance of electronics manufacturers based on web site information.

**The mention of any company, product, or process in this publication does not constitute or imply endorsement by the U.S. Environmental Protection Agency.**